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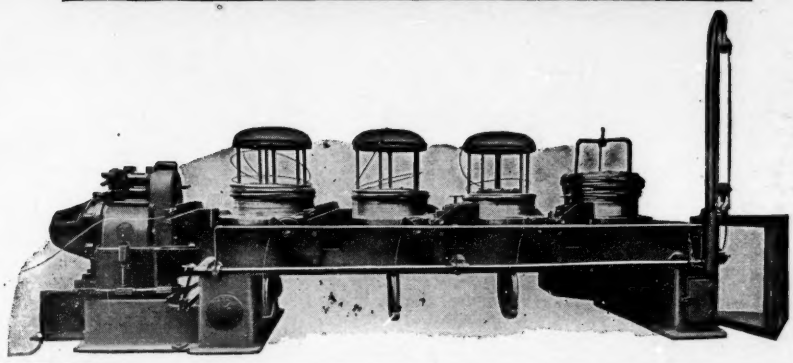
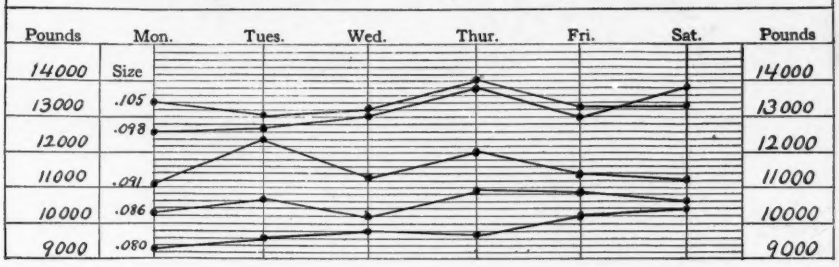


Production per man per shift (10 hours) from No. 5 Rod



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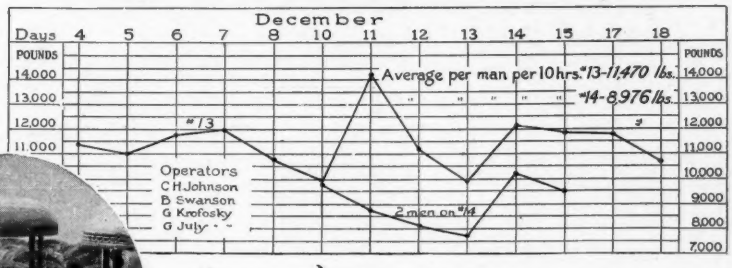

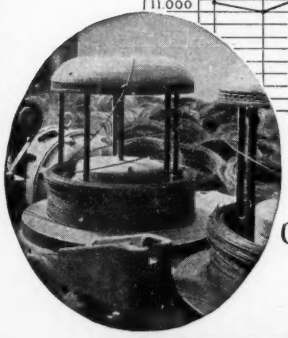

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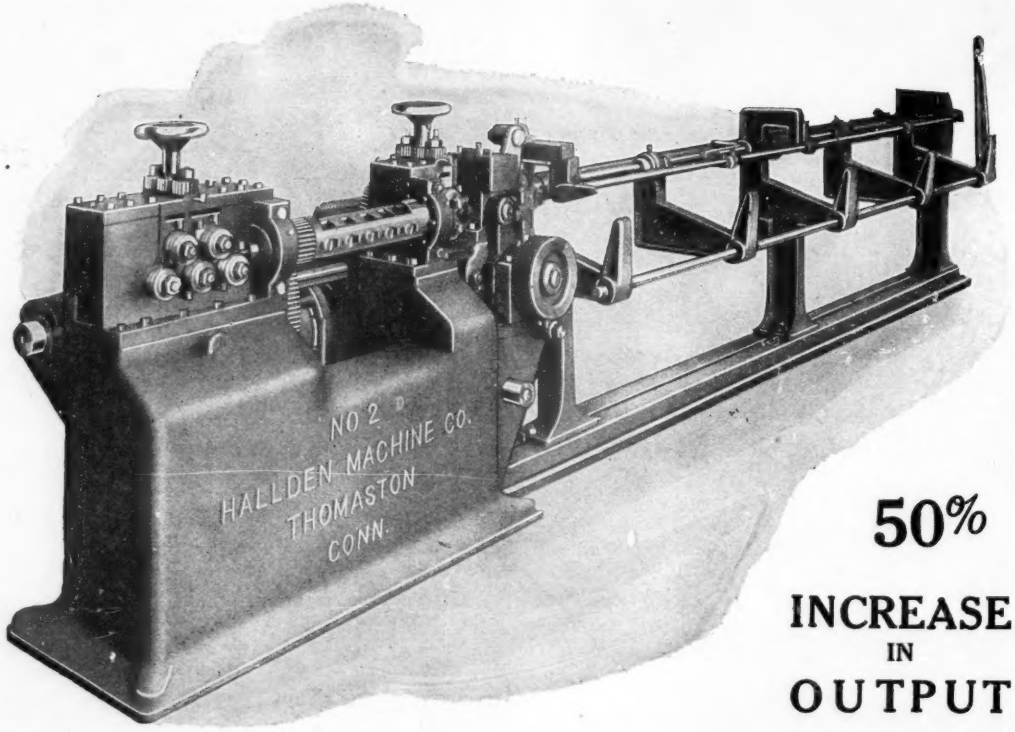

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WIRE & WIRE PRODUCTS

A monthly publication devoted to wire drawing and wire forming

Vol. 1 May, 1926 No. 1

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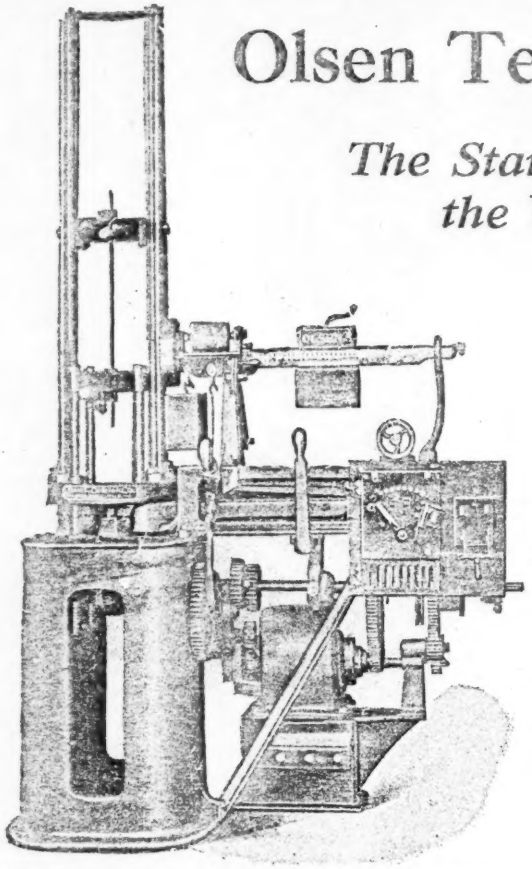

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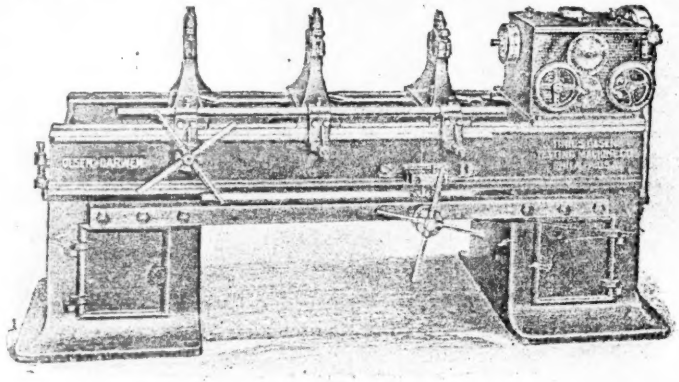

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WIRE
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Vol. I MAY, 1926 No. 1

My Thirty-Five Years of Wire

The reminiscences of a man who has seen many changes and interesting events in the wire industry

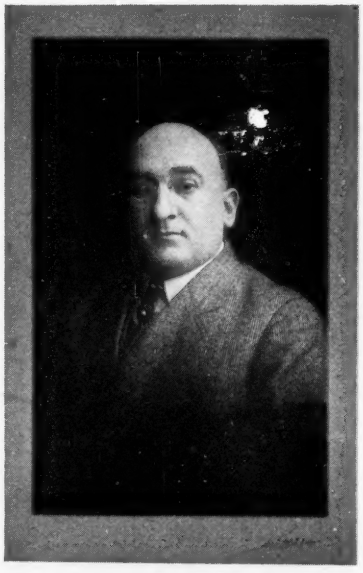
By George A. Paff

Superintendent, Rod and Wire Dept's, Wheeling Steel Corporation

THIS is not an autobiography, although the first personal pronoun will occur with inexcuseable frequency. The only apology that can be offered for this very definite breach of good form is that it is my purpose to narrate only such happenings and changes as have occurred in my own thirty-five years of observation and experience in the Rod and Wire business.

We will let a more talented historian quote from the 39th chapter of Exodus and the 3rd verse to prove that the Children of Israel in the year 1490 B. C., during their famous pilgrimage from Egypt to Canaan, had some sort of wire working equipment in their midst. Inasmuch as all that will be stated here will be well within the memory of many still living, we are confronted with the injunction "Let us be careful." For this same reason the names of most of the persons and places given will be fictitious. In all other details we will endeavor to adhere to facts.

In the year 1890, at the early age of fifteen I became an apprenticed mechanic at a machine shop located in my home town in Virginia. It was clear from the beginning that my native town did not offer any very great opportunity for my chosen line of work. One year later,



GEORGE A. PAFF

through the kind intercession of a friend of the family, I obtained employment in the rod mill of the Steelville Wire and Nail Company at Steelville, Pa. Upon my arrival at Steelville I proceeded at once to locate my new place of employment which was about one and a half miles distant from the station. On my way I saw two things which left an indelible impression upon my memory. One was the flame which periodically appeared from a hand filled blast furnace and seemed to reach the very heavens. Farther on I was attracted by the flaming stacks of the puddling furnaces of George Harrison's sheet mill. Both of these sights are now much rarer than the proverbial "Day in June."

I did not at the time know that this escapement of waste heat represented a loss which not so many years later was to be condemned as one of the unpardonable sins of the Iron and Steel business.

A short distance farther landed me at the Rod Mill where I started to work the following day. My duty was to help a Swedish millwright whom we will call Harry Jansen. Although of over-average intelligence, Harry for some reason never acquired a very proficient use of the English language. The foregoing statement is not entirely correct. He could "swear by note" and when under the magic spell of one of these spontaneous effusions his English was perfect. He possessed a violent temper and was highly nervous. When things went wrong he was sure to do two things; first he would throw whatever tool he had in his hand clear across the shop, and

secondly, he would take off his cap, throw it on the floor, and tramp on it. There was never any deviation from this rule.

My first task was to clean the sand from between the teeth of a number of cast iron bevel gears. These gears were being prepared for the first set of Williamson Graviety Discharge Rod Coiling Reels ever built, and which were under construction there at that time. The patent on these reels was jointly owned by the general manager, Mr. John Williamson, and our millwright friend, Harry Jansen. The coiling plate, and for that matter the entire mechanism of these reels, was tilted, or built on an incline so that when the pins were withdrawn from the completed bundle the coil of rods would automatically glide downward and outward onto a conveyor. This conveyor traveled in front of and served four of these reels. There have since been introduced numerous improvements and modifications of this reeling and conveying arrangement, and although the patent has long since expired, the fact remains that practically all laying reels of today are built, fundamentally at least, around the Williamson-Jansen design.

First Set of Reels

Returning for the moment to the aforementioned cast iron bevel gears, it will be noted that as late as 1891 neither cut gears or steel castings had come into very general use in ordinary rolling mill practice.

Although I have always reflected with some degree of pride that it was my privilege as an apprentice to assist in the erection of the first set of reels of that type, I must confess that after they were placed in operation, although the performance was perfect, there was one feature that proved quite disappointing to me. The operation of the newer reel was not in any sense as spectacular as the more primitive reels which had been displaced, and the performance of which had always offered a very fascinating sight. With the older design, the rod, immediately after leaving the finishing rolls, was guided into a revolving rosette which in a very simple manner, threw the rod in much the same fashion as our modern cow-boy of vaudeville coils a rope. This performance always proved especially attractive to visitors. These older reels however were unfortunately penalized by a certain mechanical up-keep and an excessive labor cost which caused the newer design to prove a marked advance in rod coiling machinery.

This is the first of a series of articles by Mr. Paff, who has lived and grown with the wire industry. The second of the series will appear in an early issue.

The Organization

One cannot take a retrospective view of a rod mill organization of thirty-five years ago without reflecting upon the difference between the personnel of that time and of today. There were of course stock-holders, directors, a general manager and a mill superintendent or foreman, and last, but by no means least, there was the Head Roller. Permit us to introduce this Head Roller. Both the position and the man were of a type peculiar to their day and generation. He was somewhat of a Czar for of a truth he was the "monarch of all he surveyed." His domain included the heating furnaces, the roll trains and the rolling crew. Every man who handled a pair of tongs was one of his subjects. He and his men were strongly bonded by being members of the same organization.

There was a committee whose duty it was to see that the rules of the organization were always strictly regarded by the Company. The laws of the order were inflexible and inviolate whenever an emergency arose whereby the Company would ask for the slightest deviation. The same rules, however, could always be made to "bend a bit" whenever the committee, by so doing, could favor "His Excellency," the Head Roller. No one could be employed on the rolling crew unless he were first a member of the organization and no one could become a member of the organization unless he were first a member of the rolling crew. Here we have a paradox supreme. Our members of Congress will please take note that they were not the originators of the deadlock. However, when the Head Roller desired to introduce into the organization one of his relatives, there was invariably a temporary "suspension of the rules."

It is recalled that on one occasion when the preliminary trial bars were about to be put through the Mill I picked up a pair of tongs and proceeded across the inclined floor to one of the slower passes for the purpose of trying my hand at catching the bar. In less time than it takes to tell it I was surrounded by the committee, the tongs were taken from me, and I was requested to leave the rolling floor, with the additional advice that whenever I was wanted for such a purpose I would be sent for. By reason of overpowering numbers I had no alternative other than to obey. I also then knew definitely that I was not one of the elect.

The wage of this chief dignitary, the Head Roller, causes a statement of bare facts to sound like a Grimm's Fairy Tale and would make a Hog Island rivet slinger feel like a genuine piker. For twenty-five years the Head Roller of the Steelville Mill daily carried his noon lunch in a dinner pail the same as practically all the mill workers did. For these same twenty-five years he wound up each turn's work with from $60.00 to $75.00 to his credit for his day's wages. More than that he received a generous percentage of the earnings of the night roller. The slogan of a certain Patent Medicine—"It works while you sleep"—was probably coined during the days of which we write.

His subordinates, the rod hands and heaters received correspondingly high wages. These earnings were typical of all rod

(*Continued on page 29*)

The Manufacture of Iron and Steel Wire in Germany

By Dr. Ing. H. Altpeter of Mannheim

From Stahl & Eisen, 1925, 45, 570

(In this series of articles the entire field of steel and iron wire manufacture will be reviewed. It will include pickling, drawing, annealing and such other metallurgical operations as are part of the wiremaking art. In this series will be found many ideas not used in this country.)

The material to be worked up into iron wire must meet certain requirements In general it is desirable that the iron from which the wire is to be drawn contain from 0.06% to 0.12% of carbon, 0.35 to 0.50% manganese, a comparatively small amount of phosphorus and sulfur, and usually but traces of silicon. It should be free from slag, as well as irregularities and tears. The relative absence of seams due to rolling and kinks should likewise be assured.

As a starting point, crude wire of from 5 to 5 millimeters, with either square, round or special cross-section is used. The weight of the coils runs from 70 to 120 kilograms (154 to 264 pounds), but for convenience only coils up to about 80 kilograms (176 pounds) are usually employed.

Cleaning

The cleaning of the wire before drawing is absolutely essential. The natural scale upon the wire can of course be minimized by allowing the same to be quenched in water immediately after rolling the hot stock, but it is much better to completely remove all the magnetic oxide by pickling the wire in an acid—usually sulfuric acid.

The oxide scale flies off in considerable amounts when the material is running through the rolls but any that remains will interfere very much with the drawing operations, requiring more power and causing deformation of the iron, besides being bad for the dies. It has been proposed to clean the wire by means of a sand blast, but according to the author's experience, this does not give satisfactory results.

The pickling of the wire is carried out in wooden vats, either round or oval, or in lead covered wooden pits made of wood, brick or cement. These are preferably about from 1230 to 200 centimeters wide and 220 centimeters deep (6 feet diam. to about 8 feet deep).

The coils of wire are immersed in these pickling vats while either hung on wooden supports or on wooden triangular supports, in which case up to 1500 kilograms (3,300 pounds) of wire can be pickled at one time. The pickling solution consists of dilute sulfuric acid, which, for rolled wire stock is about 10 to 12 deg. Be strength, and for hot drawn wire about 8 deg. Be. The bath is heated to about 60 deg. C by means of steam. The pickling is continued at this temperature for from 3-4 to 1 1-2 hours in the case of rolled wire, and 1-2 hour for annealed wire, but in any case should be interrupted as soon as all the scale is removed and before there is any decided action upon the wire itself. This is necessary in order to prevent the brittling action of the hydrogen which might be absorbed from the acid.

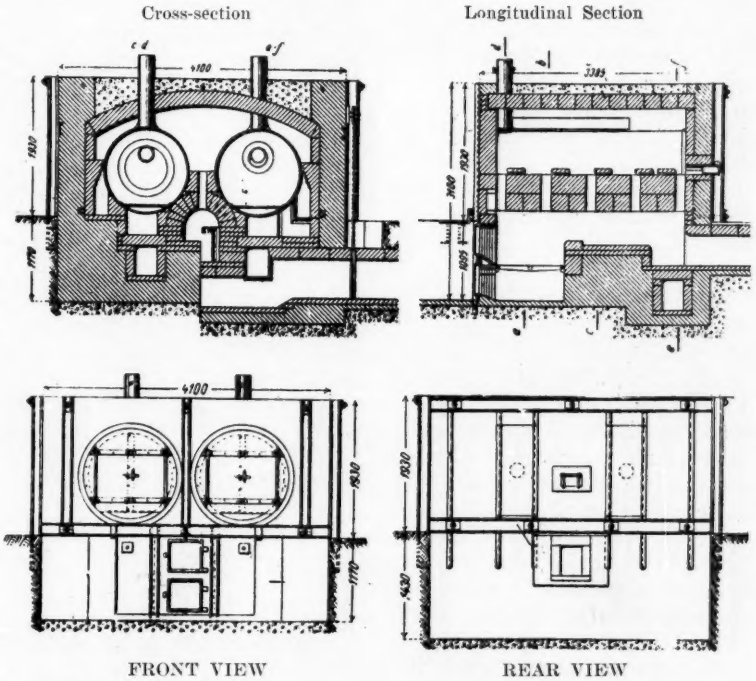


Fig. 2.—Wire drying oven using waste heat from annealing furnaces. Dimensions are given in Centimeters.

Difficulties of this type can be minimized by the addition to the pickling bath of certain reducing agents. After pickling, the wire is thoroughly rinsed and then treated with lime in separate vats. Then the coils of wire are placed on special trucks and run into drying ovens of special construction (see Fig. 2) where they are subjected to a temperature of from 120 to 150 deg. C for a few hours. This will suffice to expel any absorbed hydrogen and to remove the brittleness produced by the pickling.

The same pickling solution is used, being kept up in acidity by the addition of fresh sulfuric acid, until the specific gravity of the solution has reached 38 to 40 degrees Be for rolled wire, and 28 degrees Be. for annealed wire. When this point is reached the solution is discarded and run into a sump for final recovery of the iron sulfate (copperas). The weight lost in pickling usually runs from 1.5 to 2% of the weight of the wire. The steam and acid consumption varies according to the size of the installation but in general the consumption of sulfuric acid is about 3 to 4% of the weight of the wire treated.

In America pickling is sometimes done with hydrochloric (muriatic) acid, but in Germany this is used only before galvanizing, as the gases given off when hydrochloric acids are used are very disagreeable and there do not appear to be any decided advantages. The use of niter cake for pickling was discontinued directly after the war as it was anything but economical.

After pickling the wire is washed while mounted on a wooden support, being knocked against stone or iron plates to mechanically remove adhering scale, some dilute acid being sprayed over the same at the time. The liquid used for this purpose is allowed to settle and then used, after adding some more acid, for regular pickling operations. It is not suitable for the recovery of iron sulfate as it is too dilute.

The iron (ferrous) sulfate contained in the spent pickling baths is recovered as follows: According to the size of the plant, the concentration is either carried out by natural or by forced evaporation. When heat is used the evaporation is carried far enough to assure a saturated solution, and on cooling the same, the iron sulfate will crystallize out. The best practice is to concentrate the solution until it reads 36 to 38 degrees Be. and then to run it into lead-lined crystallizing tanks where the iron sulfate will crystallize out and the solution drop in concentration to 28 deg. Be.

The mother liquor is run off and combined in the settling sump with fresh waste pickle and thus eventually worked off. The usual yield of iron sulfate is 100 kilograms for a consumption of from 100 to 150 kilograms of steam, corresponding to from 300 to 500 kilograms of steam per cubic meter of evaporator space.

The Drawing of Wire

Reduced to its simplest terms, wire-drawing can be said to consist essentially of a method by which the material is drawn through a hole in a steel plate, the hole being of such dimensions that a wire of the desired cross-section is produced. This procedure is then repeated until the final form is given to the wire. In general, the drawplate or die is stationary while the metal moves, being usually propelled or drawn by a rotating pulley or disc, or in some cases by a moving block, sufficient lubricating materials being used to assure free passage of the material through the die.

In dies which are only slightly conical the drawing of the wire through the die causes the outer layers to be pushed backward upon the lower layers. The wire is entered into the dies, in the case of thin wires, by the wire drawer himself, or in the case of heavier wires such as those over 14 mm. in diameter (½") by means of a drawing device. This in general consists of a grip which seizes the end of the material and is drawn along a bench in a straight-away direction.

Entering the Die

In order to allow the wire to enter the dies, the ends of the same are sharpened by either filing or with some similar means. The diameter of the wires is measured with a micrometer or by means of gages. In general the drawing of wire is divided into large wire (from 14 to 4 mm. diameter), medium wire (4 to 2 mm. diameter), fine (2 to 0.7 mm.) and very fine.

The reels which pull the wire through the dies vary in diameter from 21 to 24 inches for the larger sizes, 10 to 15 inches for the smaller sizes, and 6 to 10 inches for the fine sizes, depending somewhat upon the drawing speed.

As a general rule the drawing reels are arranged vertically in groups of from 10 to 20 and are actuated by either friction or direct drive. For some purposes horizontal drawing reels are used.

The exact method of drawing varies very much, depending upon the nature of the metal, and requires unusual experience to do properly. After the wire has passed through a number of dies, it will have to be annealed by heating before it will be in a condition for further drawing. Rolled stock is generally drawn down to the 2 mm. size in the following stages: 5.5 mm., 4.6 mm., 3.8 mm., 3 mm., 2.5 mm., 2 mm.; or, alternatively, 5 mm., 3.8 mm., 2.9 mm., 2.5 mm., 2 mm. Below 2 mm. the diameter diminishes with each drawing by about 1-10 of the diameter.

——o——

THE DIES—in June

Pointing Wire By Electricity

Explaining the detailed method of obtaining a true point in wire drafting

By A. R. Petterson
Standard Machine Works Company

BEFORE wire can be drawn through a die, it is, of course necessary to reduce its diameter to a point where it can be pushed through the die and grasped by the devices that pull or draw it through the die, thus reducing it to the diameter desired.

There are several methods of doing this. One is to simply file the end of the wire. Obviously, unless this is very carefully done, the result will be anything but a true and round end.

The other way is to roll the end of the wire. This however also leads to considerable difficulty, as the wire is very likely to be irregular in cross section.

Wire pointing by electricity in the wire mill of today is as far superior to the old method of rolling, filing, swaging or hammering a point as the modern up-to-date electric locomotive is to the old fashioned wood burning steam engine used by our forefathers in the pioneer days of railroading. As the old style wire drawing frames are being replaced by more modern continuous wire drawing machanes electrically equipped so must all other production methods in the wire mill be improved.

Wire pointing, while it might sound and appear as a very insignificant part of the industry is really of great importance. The starting of every undertaking determines how it is going to be when finished. A good start, a good finish. A poor start, a poor finish. So it is true in wire drawing. If a bundle of wire is not started through the die right it is not going to finish right. To the inexperienced one, a point is a point but to the skilled wire drawer a point is not a point unless it is a good point. And a good point is only a point that is true to the shape of the wire that is being drawn. If it is round wire, then the point must be good and round as well as absolutely central. If it is square or shaped wire the point must be either squared or shaped and every line of that point must radiate in a true line to the center of the wire. If the point is not central, then the wire drawing die will be pulled out of round or shape and the finished wire will be out of round or out of shape. Not only is the die lost but the wire is also scrapped. The scrap wire item in some wire mills is very big.

One way to prevent scrap wire is to start it right. A point made on an electric wire pointer illustrated is perfectly true and will always start the wire right. This method of pointing is by far the cheapest and best method. The wire is simply placed in a pair of gripping jaws, one of which is moveable, and at the same time the wire to be pointed passes through a pair of spring terminal clips which are connected to the secondary side of a transformer.

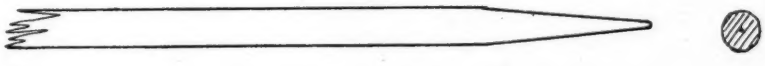
True and Smooth

When the switch is turned on, the wire between the spring terminal clips heats up to a cherry red at which time the lever connected to the moveable jaw is pulled thereby stretching the heated wire until it breaks. By this method the wire will always pull to a true point. Not only will the point be perfectly true but it will be very smooth. A true, smooth point will never scratch the die or pull it out of round. The operating cost for making points on No. 5 wire is less than three cents per 100 points. The upkeep cost of this type of pointer is nothing. There are no rotating parts to wear out.

(*Continued on page 31*)

A rolled point will be uneven and out of round as well as have fins and slivers, as illustrated. It is necessary to file off the fins before it can be used. Being off center it cuts out the die. Being rough, it scratches the die. A filed point is about the same only it has no fins or slivers.

An electric point pulls out perfectly smooth, and true to shape. It starts **right** through the die. It makes for longer life for the dies and produces all good wire.



Enlarged section of a rolled wire point.

Enlarged section of a filed point.

An electric point will be perfectly round and smooth.

Reduction of Tungsten to Filament

Here is described the General Electric Company's use of gas in the production of electric lamps

By J. B. Nealey
Surface Combustion Company

THE electric lamp, although not a complicated thing, is formed of ingredients from different corners of the earth. For the bulb and the base of this magic light of the ages come silica and clay from deposits in North America; for the wires and socket, copper is sent from the high altitudes of South America; for the delicate filaments comes tungsten from the listless mines of China. Tungsten, after all, is one of the most essential ingredients; without it sustained incandescence would be well nigh impossible.

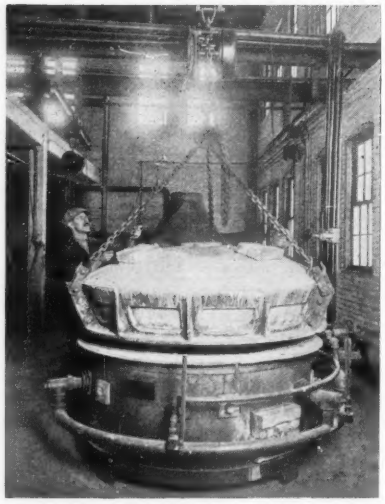
This metal is mined and concentrated in China and when it reaches the General Electric Company in America, it contains from 25 to 40 per cent rock and other impurities. In the works at Little Ferry, New Jersey, pure tungsten oxide is extracted from the ore. By a process of heating in hydrogen, the oxygen is then driven off and practically 100 per cent pure tungsten metal is thus obtained.

Commercializing Tungsten

It is interesting to note that only a few years ago, tungsten was considered a rare metal and was produced only in the chemical laboratory. Today at the Little Ferry plant of the General Electric Company this metal is produced by the ton.

The reduction of the tungsten oxide, which is the crux of the whole process, is accomplished in gas-fired furnaces especially designed by the engineers of the Surface Combustion Company. These furnaces combine a new type of burner and method of combustion and heat radiation, which give them a high rate of efficiency and low maintenance cost.

The reduction furnaces used at the Little Ferry plant are known as tube furnaces. They are 12 ft. long and contain from 10 to 20 small heat-resisting tubes which protrude through the walls of the furnace at each end. Provision is made for circulating pure hydrogen through these tubes. The tungsten oxide in powder form is placed in small metal boats which are inserted and advanced periodically through the tubes. The furnace is operated at a temperature of 1400 deg. Fahr. The total time required for a single charge to pass through the heat zone is approximately three hours. The metal as produced is in the form of a fine gray powder. From this point the fabrication of the metal is continued at the Harrison Wire Works.



Molybdenum Reduction Furnace at Little Ferry Works of General Electric Co.

The metal powder is pressed into small ingots under a pressure of 10 tons per square inch by means of a hydraulic press. These pressed ingots are then electrically sintered at a temperature of 5500 deg. Fahr. At this stage the ingots are very hard and exhibit a metallic luster.

After sintering, these ingots are heated in a series of gas furnaces and swaged down to 0.030 in., in diameter, after which they are drawn down to 0.0025 in. as an average diameter. They are then ready for the lamp. Tungsten wire requires a very high swaging temperature, and to swage continuously at a high rate of speed requires a furnace capable of developing a dazzling white heat. The furnace used develops a heat of 2900 deg. Fahr.

Molybdenum ores are also treated at the Little Ferry plant. Pure molybdic acid is extracted from the ore and is then heated in carbon crucibles in a large crucible gas furnace to a temperature of approximately 2500 deg. F. The resulting mass is removed to another tube furnace. This furnace is 5 ft. long and carries three 6-in. tubes which project from either end. Metal boats are used to convey the material through the tubes. Hydrogen is circulated through these tubes and the reduction to metal is completed as the metal boats come through.

Duplex Wire

The molybdenum metal powder is worked into wire similarly to tungsten at the Harrison Wire Works. This wire is used as supports for the tungsten filament in the lamp.

Owing to the difference in expansion and contraction between tungsten and glass, and the nonbonding properties of these two elements, a special duplex wire has been developed to lead in through the glass stems of the

Mazda lamp. The tungsten wires are clamped to these duplex wires before they are placed inside the glass bulbs. The furnace shown in the illustration is essentially vital in the process of producing this duplex or "lead-in" wire. The purpose of this brazing furnace is to bond the iron alloy core to the copper sleeve. This must be done in a very thorough manner so that the sleeve will adhere to the iron core throughout all subsequent fabrication of the material. The percentage of each of these constituents must remain constant throughout all processing.

This delicate work is accomplished in a furnace especially adapted for the job. The core rods are about 6 ft. long, over which a very thin sheet of brass is wound. This is then inserted into a copper tubing sleeve. A number of these assembled units are placed in pipes running through the furnace and heated to between 1920 deg. F. and 1940 deg. F. The several thermo-couples throughout the length of the heat zone, must register within this range, for below 1920 deg. F., the braze is unsatisfactory and at 1975 deg. F., the copper will blister. A test is made after the braze, but only one cross-section is taken as a criterion of the entire rod. A poor bond in any other section of the rod may remain concealed throughout the subsequent process of drawing into the fine wire. A poorly bonded wire in this case acts as a by-pass of the wire-glass seal, permitting air to leak through. It cannot be detected until sealed in a lamp, at which time it asserts itself. Hence, the perfect heat control of this furnace is an invaluable feature, which is eminently important.

Assembling

The completion of the Mazda lamp is achieved by inserting two duplex wires in the glass stem, which is heated to the melting point and sealed by slight pressure. After the tungsten filaments are welded or pinched on, the whole assembly is then put into a glass bulb and sealed with heat. A small tube is left open through which the bulb is exhausted and the opening immediately sealed. The base is cemented on and the lamp is made.

New Type Burner

These gas-fired furnaces, which are so important a factor in the electrical industry, combine a new type of burner and process of radiation. Low and high pressure systems are used, the type being governed by local conditions, but in both, single valve control features. In the high pressure system a small compressor boosts city gas from line pressure to about 10 pounds and this high pressure gas passes through a patented inspirator where it sucks in the exact amount of air for perfect combustion. This ratio is maintained without the aid of moving parts or governors and the burners are supplied through the inspirators with a perfect mixture while the rate of flow, or heat control, is regulated by means of a single valve.

The low pressure system varies from the high pressure installations, in that a pressure blower raises the air pressure to one or two pounds, while gas is inspirated at zero pressure and the mixture of the two is controlled by the action of a governor which automatically maintains an accurate and exact ratio between the two.

The air-gas mixture coming from the burner is always exactly proportioned for complete combustion and heat radiation, the fastest and most effective

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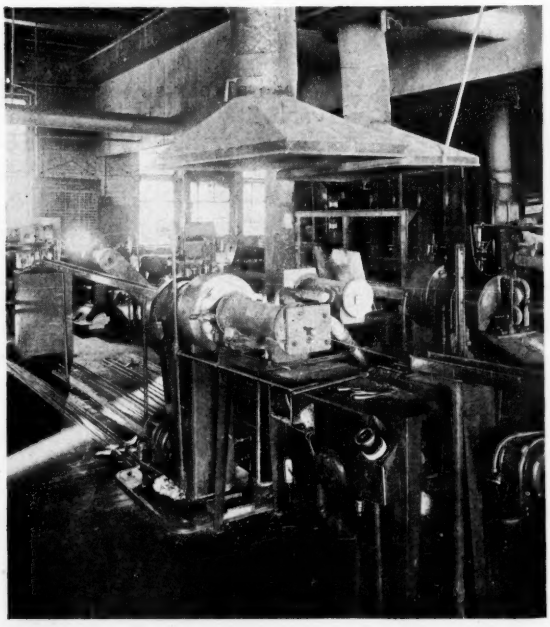
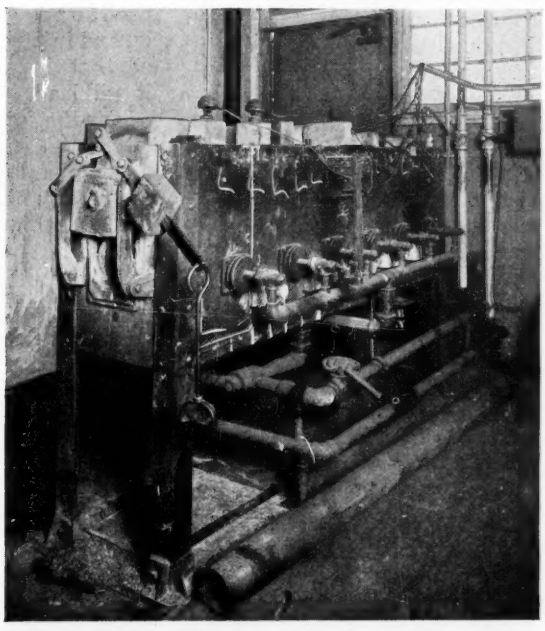


Swaging Furnace for Tungsten wire at Harrison, N. J., Works of General Electric Co.



Furnace for welding core to sleeve of Duplex wire at Harrison, N. J., Works of General Electric Co.

Trademarking Wire Products

By Waldon Fawcett

Washington Correspondent, Wire and Wire Products

THE most important news that 1926 has brought to the wire industry is that the boundaries of the wire products field constitute the horizon of wire branding. The announcement of this limitation is all the more important to an industry that, as in the case of the wire trade, is "feeling its way" in the identification of its commodities to ultimate consumers. As our readers realize, not a few of the leaders of wiredom were long skeptical, if not of the advantages, at least of the practicability of trade-marking wire products.

Admittedly, it was no mean problem that was presented in the responsibility of providing wire-marks that would carry through to final purchasers. And it was entirely natural and logical that wire men, having had their own troubles in distinguishing hard-to-brand merchandise, should be keen, when the time came, to capture trademarks that would be exclusively theirs in the broadest sense. It is on this point that an exceptionally important principle has just been instituted by no less an authority than the Supreme Court of the United States.

Fifty Classes of Trademarks

Pioneers of trade-marking in the field of wire and wire goods have realized from the outset that it was out of the question to secure, by direct approach, as we may say, an unlimited monopoly of a merchandise-mark, even if the mark originated in the wire industry. For the purposes of the administration of Uncle Sam's system of trademark certification, the commercial and industrial field is apportioned in fifty odd classes or sections, each made up of groups of related commodities. Ordinarily, the intent is that the certifiers at the U. S. Patent Office shall testify that the first-user of a mark has the right of exclusive possession of that mark in one of the above-mentioned classes or trade communities. Sometimes, and the wire trade affords cases in point, a manufacturer may take title for a mark in two or more classes. But such instances are rare.

Wire being one of the hard-to-brand products it is important that those firms contemplating a trademark should know the requirements and decisions for registration. The author is an authority on the subject and discusses in detail past cases and present methods.

So much for the direct approach. But the fact that the registration bureau at Washington has not been prepared to issue unrestricted franchises for branding has not made wire men resigned to this situation of piece-meal trade-mark protection. The utilization of wire products is developing so rapidly, and in directions so unexpected, that there is no telling where it will lead. To be fully prepared for the future, the expansionist in the industry has coveted a "universal" trade-mark,—a commodity nickname or commercial thumb-print that shall be unique not only in the wire sector but in the entire world of industry. Balked in the effort to secure a blanket registration for a trade-mark, the resourceful business men in wiredom and other industries believed that they could accomplish their purpose by trade name protection.

For a year and more past, the strategists have been obtaining 100 per cent protection in this round-about way. They have been, in effect, entering the trade-mark stronghold by the side door. Since a trade-mark may be registered only for those classes of goods on which the mark is actually in use in interstate commerce at the time the application is filed, there is no chance to stretch that claim, albeit the Federal censors do recognize the right of a mark-owner to have his mark follow a reasonable expansion of his business. But the nation's trademark laws contain a provision that no mark shall be registered which is merely the name of an individual, corporation, or association not printed or written in a distinctive manner. That little "joker" in the law seemed to spell salvation for the would-be monopolists. If a brander could not register his mark for all classes of manufactures he could accomplish the same purpose of keeping his mark to himself by making the mark a part of his corporate name and thereby preventing everybody from using the mark.

Refashioned Trademarks

Here, if you please, we have the secret of the scramble, during the past year or two, on the part of so many concerns that have adopted new corporate titles or refashioned old ones, to embody their trade-marks. Several Federal courts had approved this substitute for blanket trademark registration and the Patent Office was turning down all newly offered trade-marks that

The pace-maker which defines the ethics for trade-marking of this pattern is to be found in the memorable case of A. Leschen & Sons Rope Company, versus Broderick & Bascom Rope Company. When this case gained the attention of a U. S. Circuit Court of Appeals, the judges declared that a mark which is described as consisting of a colored strand in a wire rope but is not restricted to any particular color can not be sustained as a valid trade-mark. Then, another Circuit Court of Appeals, passing upon a dispute between

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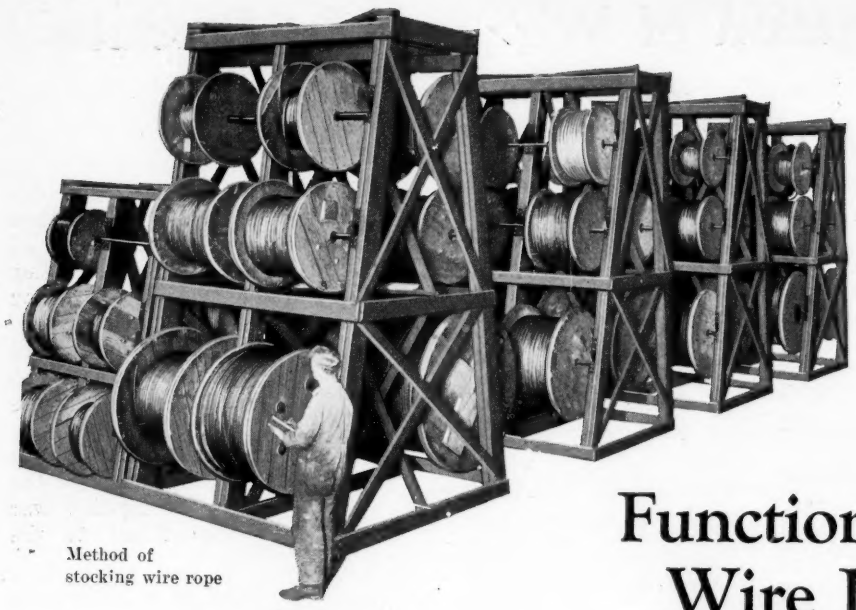


Method of stocking wire rope

Function of the Wire Jobber

By Walter S. Krenz

Manager Wire and Spring Division, Steel Sales Corporation

"JIM, I'm simply up against it," Smith of the Jones Manufacturing Company was saying. "I've got to have a thousand pounds of No. 11 gauge Tinned Basic Wire, straightened and cut to 26″ lengths by tomorrow noon, or I will lose one of my best customers."

"Well, why the worried look, we can fix you up," responded Black of the Reliable Steel Warehousing Company. "If you don't believe it, just step out here into our plant, and I'll show you how we are turning out dozens of orders such as yours every day."

The Answer

Smith's dilemma and the way it was licked is a good illustration of the situation thousands of manufacturers meet, and of the service the live wire jobber is rendering in order to meet such problems.

First of all, if the wire jobber of today is to live up to his opportunity and to perform the function which is expected of him, he must have on hand a wide variety of stock.

Wire is used for an endless number of purposes and in innumerable lines of business. At 10 o'clock in the morning the jobber may receive a call for an order of Cut Florist Wire for making a bridal bouquet for the Duchess of Czecho Slovakia. At 10:30 another extreme, when he has a call for some ⅜″ Oil Tempered Spring Wire for making a form to put back into service a very high priced machine. Each customer expects the jobber to have on hand the particular kind of wire which he wants, and if the jobber does not have what he wants the prospect is naturally dissatisfied.

The following are some of the kinds of wire carried by one of the leading Chicago jobbers: Basic in bright, coppored, tinned and galvanized finish, Armature Binding, Rivet quality wire, Black Annealed, Coppered Bessemer Rods, Music and Piano Wire, Round and Square Tempered and Untempered Spring Wire, Furniture Spring Wire, Coppered Spring, Bright Annealed Florist Wire, cut and in stones, Tinned Tag Wire, Copperweld, Flat Wire, Welding Wires, also non-ferrous wires, such as Brass, and Phosphor Bronze, soft and spring temper, Nickel Silver, Monel Metal, pure nickel and perhaps other grades the author has overlooked.

In the second place the wire jobber worthy of the name, must have not only a wide variety of stock, but sizeable quantities of each kind, particularly of those sizes which are most commonly used. A large percentage of buyers who patronize the warehousing jobbers not only buy in small lots such as 100 lbs. quantities and less, but are mill buyers purchasing in carload lots. Frequently they are not able to anticipate their demands with a degree of certainty from the mill, and find it necessary to purchase from the jobber to tide them over until the mill shipment arrives. It is a decided advantage for such a jobber to represent a reputable mill manufacturing a wide range of products.

Location and Facilities

A third requisite of the modern wire jobber is central location and adequate facilities for handling. Buyers demand that the jobber make immediate shipment of all orders, consequently in order to be successful he must be located in a strategic railroad center. Furthermore, it is necessary that his warehouse be located convenient to side tracks and freight depots. He must

(*Continued on page 30*)

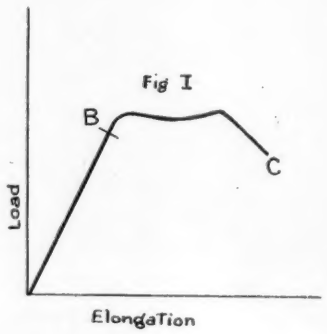
The Elongation of Wire and Its Products

By L. D. Granger

Metallurgist, Wickwire Spencer Steel Co.

MANY wire specifications still call for elongation. It is not purpose here to quarrel with the fact or the theory, but merely to discuss what elongation is, how it should be measured, and what precautions must be taken if the specifications are to be at all understandable or possible to be met by the producer.

Elongation is often specified as a certain percentage in a certain length, no mention being made of how, when or where the value is measured. In order to see just what this means, let us consider what happens when a wire stretches.



If we plot a typical stress strain curve as in fig. 1, we find it divided roughly into two very distinct portions, A-B and B-C. A-B is a practically straight line treminating in an irregular section, B-C which may take one of several outlines according to the nature of the wire. The straight portion represents the elongation of the test piece below the limit of proportionality and the curved section, the plastic deformation. The slope of the line A-B represents the modulus of elasticity of the material under test, and the lateral extent of the line B-C represents the permanent elongation after the elastic limit has been passed.

The situation is further complicated by the fact that a greater or less "necking down" occurs at the point of fracture, varying with the contraction in area of the material (fig. 2). This throws a much greater permanent elongation onto a small length of the specimen, resulting, of course, in a much larger percentage of elongation at this point.

Fig - II

Typical fracture showing necking down and final portions of gage marks originally one inch apart.

The effect of this local reduction may be seen from the following tests on copper wire on which the elongation has been measured over various lengths:

The ordinary American practice is to specify the elongation desired in a definite length—two, four, eight or ten inches—regardless of the diameter of the wire. This results in widely varying figures depending upon the amount of drafting the wire has received. A low carbon annealed wire may elongate 30 per cent in 10 inches, and when hard drawn, the elongation may be reduced to two per cent or less, the local elongation at point of fracture losing its influence over so long a gage length.

British practice, particularly for research work, calls for the measurement of elongation over a length proportional to the diameter of the wire, thus standardizing the effect of the local elongation — Adam (1) recommends a length four times the square root of the area, or approximately 3.54 xd, and has given results of tests made on this basis. Goerens prefers a length ten times the diameter of the wire, and reports many tests on this basis in his valuable set of experiments on wire drawing (2).

The advantage to be gained from a factor length is that the

(*Continued on page 22*)

Table 1—Elongation of Copper Wire

Gage Length Inches	.600 Annealed	Per cent Elongation Hard Drawn	Hard Drawn
12	45.	4.0	1.8
10	46.	4.5	2.1
8	48.	5.0	2.4
6	50.	6.0	3.0
4	53.	7.5	4.0
3	58.	10.0	5.2
2	63.	13.0	7.2
1	75.	22.0	12.0

(1) From Catalog of Electric Wires A. S. & W. Co.

Getting the Best Out of Diamond Dies

These common-sense rules should be observed to get maximum service

By B. J. Boulin
Vianney Wire Die Works

DIAMOND is a natural product, its hardness cannot be controlled. That is one fact. Here is another one: Because diamond is the hardest material known to man is no reason why it should not wear out. But diamond will not wear out fast if proper care is taken.

A diamond can stand a great deal but that does not mean that it should be abused. The elongation between each die must be even, the elongation depends on the metal to be drawn. There is no limit to the speed at which to draw, provided the dies are shaped for such speed. If there is too much draft, either the wire or the stone will break.

Inexperienced men will very often use a die in need of repairs or worn for "breaking down," not realizing that the number of mills which have to be drawn by the following die is then too much for it.

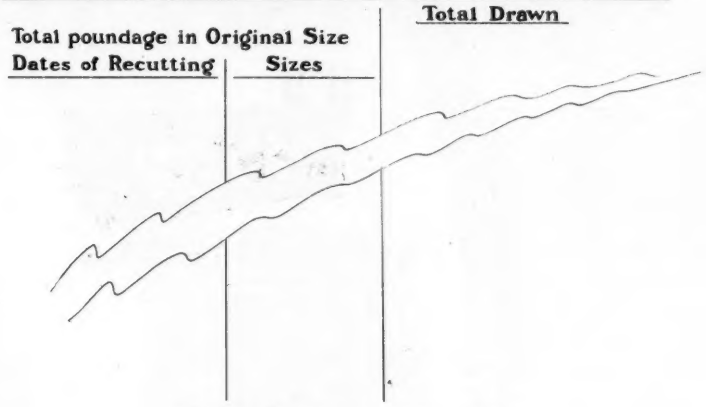
If there are several dies in bad condition in the same set, the finishing dies will of course wear out quicker. It has been the general belief that so long the finishing die was correct as to size, it did not matter if the preceding dies were round and exact in size. This is wrong of course.

Every die from the first to the last must be round and exact to size. The wire will run smoothly through each die and every one will furnish the same amount of work, regularity here will produce tonnage.

As a rule dies are not recut often enough. In some plants this is not done because it is thought quite a saving is made that way. In fact a loss is incurred through this practice as the dies, once worn out, lose their protecting polish and desintegrate quickly. Another important result is the loss of different intermediate sizes which cannot be obtained as such dies have to be recut much further to put them back in good condition.

DIE	SIZE
Make	Weight
Date purchased	Cost
Date of breakage	Scrap Value

Put all the detail of the work done with this Die on other side of card.



A working record for each die with reverse side shown below.

In order to get the best service from diamond dies the following general rules should be observed:

1—All the dies of a set should have the same elongation. (Brown & Sharpe sizes for copper for instance).

2—Have the dies inspected often, not only the finishing die but the "breaking down" sizes as well.

3—Have the dies recut at once, as soon as found out if round or otherwise defective.

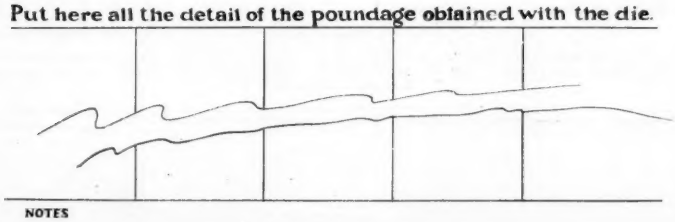
4—Do not use such defective or out of round dies for breaking down. Have them recut. Feed only round wire to a diamond die.

5—Watch your lubrication.

6—See that the wire comes in and out of each die straight.

7—Keep records for each die. Indicate size, price, weight, make, date of purchase the tonnage obtained in original size, times it was recut, sizes recut, tonnage resulting from the repaired dies, date of breakage and scrap value.

Put here all the detail of the poundage obtained with the die.

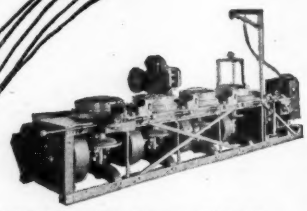


Automatic Wire-W

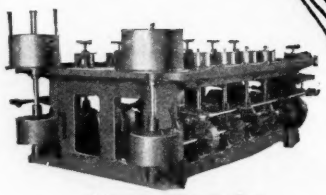
SPRING MAKING MACHINERY

Wire Coiling Machines
Wire Forming Machines
Wire Nail Machines

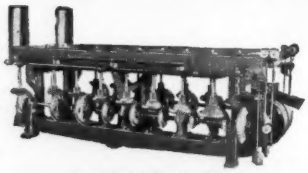
Sleeper & Hartley TRADE MARK



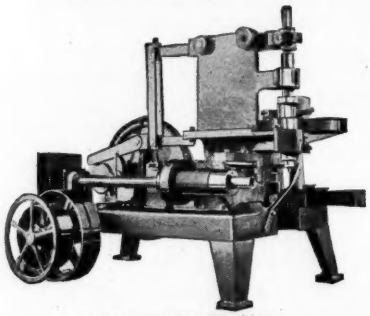
Continuous Rod Frame. (4-draft)



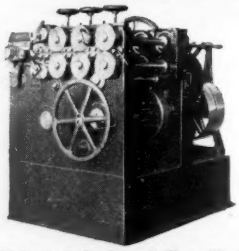
Double, 5-Draft, Dry
Continuous Wire Drawing Machine



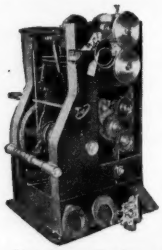
Double, 8-Draft, Wet
Continuous Wire Drawing Machine



Torsion Spring Machine

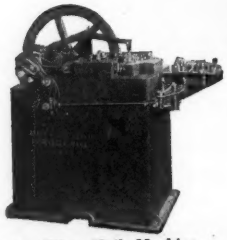


Universal Spring Coiling Machine



Furniture Spring
Coiling Machine

Flexible Shaft Coilng
Machine



Universal Wire Nail Machine

Wire Straightening and Bundling Mchs. Wire and Hose Armoring Mchs.

AGENTS: CHICAGO TERRITORY, Neff, Kohlbusch & Bissell, Inc.

WORCESTER SLEEPER &

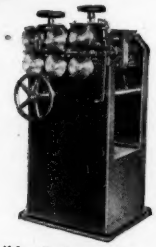
FOREIGN AGENTS AND REPRESENTATIVES: UNITED KINGDOM—Mr. Fredk. A. Perry, 63 Queen Victoria St., London. E. C. 4. FRANCE—Mr. Edgar Bloxham, 12 Rue du Delta, Paris. BELGIUM—Isbecque, Todd & Cie., 25-27 Boul. Emile Bockstael, Brussels.

Working Machinery

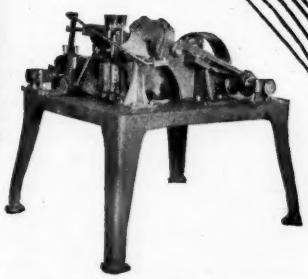
CONTINUOUS WIRE DRAWING MACHINERY

Cable Armoring Machines
Staple Machines

Stieper & Hartley TRADE MARK



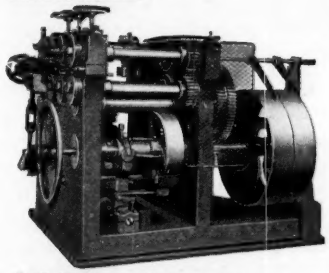
Flexible Casing Coiler



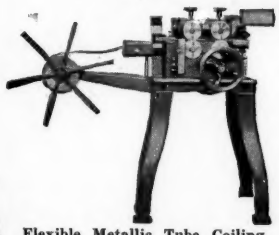
Helical Bed Spring Cutting and Hooking Machine

Ring Coiler

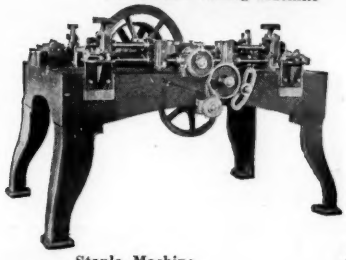
Wire Reel



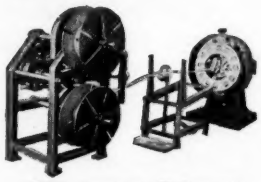
Lock Washer Coiling Machine



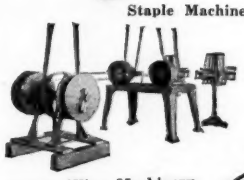
Flexible Metallic Tube Coiling Machine



Staple Machine



"BX" Armoring Equipment



Screw Wire Machinery

Lock Washer Mchs.
Stranding Mchs.
Tungsten Filament Winding Mchs.

& HARTLEY, Inc. MASS.

ITALY—Henry Coe & Clerici, Milan. AUSTRALIA AND NEW ZEALAND—Edwin Wood Pty., Ltd., Melbourne.
JAPAN—Andrews & George Co., Tokyo. SWEDEN AND FINLAND—Akt., Rylander & Asplunds, Stockholm.

EDITORIAL · IMPRESSIONS

The Scope of This Publication

SOME months ago, half a dozen men sat around a lunch table in New York, talking about a lot of different things as any diversified group will do. The majority were publishing men so the topics naturally drifted to trade journals. One of the men present, in the wire business, as it happens, made the statement that there was no paper for wire men, they had to read what they could get here and there and everywhere, and that it was a shame so large an industry would not support a paper of its own, devotedly whole-heartedly to its interests.

From that chance remark was born Wire and Wire Products. One of the publishers was receptive to such an idea and in the subsequent months made many quiet investigations. The statistics on establishments making wire or requiring it at some stage in their processes were a revelation to him, although it took many weeks of ceaseless toil to gather them.

Each outstanding individual in the industry, consulted on the subject, (and there were many of them) agreed that it would be a splendid thing, providing the industry could be wakened up to support a separate journal. These men were unanimous in agreeing on the need for it.

The business men of the better class, concerned (although indirectly) with the industry, were favorable. That is just what it needs, they said, something to knit the industry together, to show the different divisions of it how much in common their interests are, to point out all the new inventions and developments which have affected or will affect their businesses, to point out those steps in manufacturing and merchandising progress which they should take, to make it plain that to stand still, not to progress, in these days is really going backward.

A manufacturer of equipment said that his business had only two enemies. They are: The man who is perfectly satisfied to do as his father and grandfather did before him; and the close buyer who feels that up-to-dateness costs too much.

These two, the standpatter, the complacent advocate of no change, and the penurious one who feels that old and worn-out equipment and methods are satisfactory so long as they will function because he does not wish to pay the price for newer and better, are really enemies of the industry.

Better, more modern equipment, machinery and methods make for a better product, one which can be sold more widely. New uses are found for it, widening sales fields still further, so that in the end, no matter what the superior or faster equipment costs, it pays for itself. For one thing, Wire and Wire Products dedicates itself to better equipment and methods and more of them.

The future of the industry may be said to depend upon the progress of the next few years. A few years ago, radio was a laboratory curiosity. More than a half billion dollars' worth of radio apparatus was sold last year. More than five million sets are now making that many homes happier every day and night in this country. More than 35,000 dealers, some of them in other and different lines previously, are making good profits selling sets and parts.

Where would all this be if all of us were of the standpat, good enough type on the one hand, or too stingy to spend money on the other?

With marked forward developments taking place in almost every field of human endeavor, the wire industries cannot and must not stand still. This journal declares its policy to be one of keeping its industries fully informed on all forward-looking tendencies, and to that end will devote time and effort without stint to digging out inventions of merit, new processes, new and improved methods, anything and everything which will help to make a bigger, better, more prosperous and more respected wire industry.

WIRE & WIRE PRODUCTS

So Big

WERE you asked, point blank, 'How large is the wire business, including all its ramifications?' quite likely you would be unable to answer. Perhaps one reason for this is the tendency to think about wire as just a form of iron, steel, copper, brass or aluminum, as the case may be. As a result of this tendency, all too many class the wire industry with the production of the metals.

And yet, a few cold hard figures show that this is unwarranted, that it is sufficiently large to stand alone, so large that it is surprising that it was not considered separately many years ago.

General figures on the industry, based on Census reports for 1921, and corrected for 1923 where data are available, show that there are more than one thousand establishments with an annual product valued above a billion dollars.

Plants devoted wholly and exclusively to wire and wire work exceed 525 in number and the

(*Continued on page 33*)

WIRE IN THE NEWS

FAMOUS BROOKLYN BRIDGE RECEIVING ITS FORTIETH ANNUAL PAINTING.

Photo shows painters high up in the cable supports of the structure, with the skyscrapers of New York making a picturesque background. A misstep or slip would mean a drop of more than 200 feet to the river.

A fact that is little known is that Brooklyn Bridge, the first of the famous East River spans which connect the boroughs of Manhattan and Brooklyn, N. Y., city, is always receiving a new coat of paint. For forty years a gang of painters—ranging from 40 to 50 in number—have been always employed in painting the structure. One year is required to paint the structure and as soon as the annual painting is finished the next one starts.

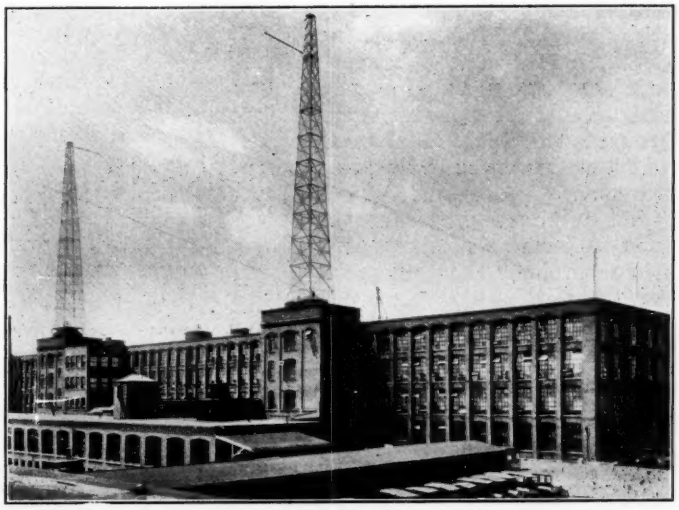
THE LARGEST CRANE IN THE WORLD AT THE ARMY BASE, SOUTH BOSTON.

The largest crane in the world at the army base, South Boston, recently put in service, has a maximum capacity of 50 tons at a radius of 90 feet. There are two auxiliary hoists with capacities of 15 and 5 tons at a radius of 130 and 133 feet, respectively. This weight is distributed over 32 wheels through a system of trucks which equalizes loads on the wheels. These wheels run on 22 feet gauge tracks. The trucks are so articulated that the crane will traverse the curve at the head of the dock having a center line radius of 89 feet.

MUTE CARRIERS OF ETHER EXTERTAINMENT TAKE MANY FORMS—ANTENNAE STILL EXPERIMENTAL.

Photo shows "A" building of the Westinghouse Electric and Manufacturing Co., at East Springfield, Mass., showing on its roof the antennae of Station WBZ.

It is interesting to note the various antennae of some of America's most powerful radio broadcasting stations. Each in its style is different than the other and thru the gigantic towers of all of them the electrical energy is sent upward, outward, through the ethers, which your receiving antennae picks up and conveys to your set, which transforms it into some form of audible entertainment.



Please send photographs of interesting and unique uses of wire to News Editor, Wire and Wire Products, 461 Fourth Avenue, New York

New Book On Wire

Review of a recent book that is of outstanding interest to the industry

WIRE-DRAWING AND THE COLD WORKING OF STEEL, by Alastair Thomas Adam, 7½ by 10, bound in boards 212 pages, 72 illustrations including charts, 42 tables. H. F. & G. Witherby, London, price $12.

As the Author states in his preface to this new British book, no text- book dealing with wire and allied products of cold-working processes has appeared since the publication of Bucknall Smith's memorable work on Wire. Its Manufacture and Uses, in 1891.

This statement gives two clues to the character of the new work; it is a text-book and it brings up to 1925 all the available material on the product, wire, and on the products of cold-working processes. And referring back to the title, it will be noted that the Author specifically refers to "steel." He dismisses the non-ferrous metals with six pages, mainly referring to the metallography of various nickel alloys, including that natural alloy, monel metal.

The book starts by describing, largely in outline, the process of making steel, of making wire rods, and of converting the latter into various forms of wire and the smaller shapes, ribbons, flats, etc., which are grouped with wire, usually and which are produced in the same manner.

After skimming briefiy over such subjects as pickling, brittleness brought about in pickling, lubrication, wet versus dry drawing, die plates, wire gauges and reduction per pass, he gets into the physical and chemical qualities of steel, heat treatment and annealing from a metallographic point of view, and the effect of cold working on the physical properties.

While much of this has been written for the man of thorough education and complete knowledge of chemistry and metallography, there is a great deal in the book for the practical worker who wishes to improve his knowledge of wire production, more especially steel wire. Chapter VIII on The Effect of Heat-treatment after Cold Work is splendid and considers thoroughly all after-treatments, including blueing, annealing, tinning, galvanizing both hot and cold, lead dipping and coating and other processes.

The book has one valuable feature, at the end of each chapter a number of references to the technical literature on the subect are given. While the majority of these are to British publications, anyone should be able to get them in the library of any large city. Were a person to look up and read each and every one of these, he would have received many times the information contained in the book, complete though the latter may be.

Thus at the end of Chapter I, 17 references are given; of Chapter II, 5; of Chapter V, 13, etc.

This work should be in the library of every plant, every metallurgist, chemist, engineer, executive concerned in any way with wire.

The Elongation of Wire

(Continued from page 16)

per cent of elongation becomes nearly constant after the first few drafts, and that the relative values of different stocks and treatment may be compared more accurately.

The following tabulation shows as a matter of interest the results as obtained by Goerens.

We will not attempt here to draw inferences on conclusions regarding the relative merits or advantages of the two systems —each has its good points, and also its drawbacks — factor lengths are difficult to handle, especially for fine wires, and the necessary microscopic measurements eliminate them from our American commercial practice.

In specification for elongation three items must be given:—

1—The elongation desired
2—The gage length
3—The method of measurement.

The amount of elongation to be specified depends upon the kind of wire and also upon the other two factors—A long gauge length reduces the percentage, and the measurement by butting marked samples after fracture, will give lower results than measuring by means of an extensometer at time of fracture.

(1) A. T. Adam—Wire Drawing and the Cold Molding of Steel.
(2) P. Goerens — Cargenie Memoirs, 1911 p. 320.

Material Uses:

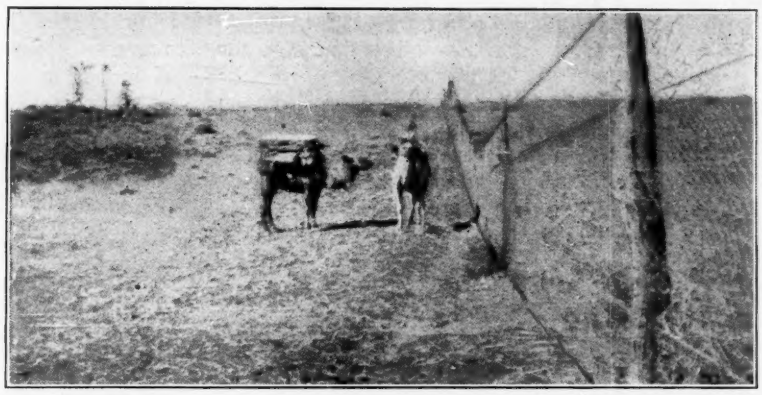
A. Open hearth steel—.55% carbon
B. Electric Steel—.12% carbon
C. Open hearth steel—.78% carbon
D. Basic Bessemer Steel—.07% carbon
E. Basic Bessemer Steel—.09% carbon
F. Electric Steel—.62% carbon
G. Electric Steel—.27% carbon
H. Wrought Iron—.11% carbon
I. Electric Steel—.98% carbon

The Davis-Jones Wire Co., Phillipsdale, R. I., has let the contract for the erection of a plant and office.

Table 2

Elongation of various wires measured in a length of 10xdia.

Drafts	A	B	C	D	E	F	G	H
0	23.3	32.7	19.2	30.6	29.2	17.1	29.9	26.1
1	6.8	15.6	7.6	8.5	9.5	2.7	13.2	10.7
2	5.9	13.7	6.9	6.2	6.7	2.7	9.3	6.0
3	6.5	10.2	5.9	6.0	6.0	2.3	4.5	3.5
4	6.0	6.7	6.2	6.3	4.1	2.5	4.5	(0.5)
5	6.3	6.0	6.0	5.7		2.5	2.9	(1.5)
6		6.0		4.9				3.0
7				5.2			(0.5)	



South Australian border fence and boundary rider.

Wire Protects An Empire

By Arthur W. Upfield

Courtesy of The Wide World Magazine

WIRE and wild dogs, might seem to be an impossible distance apart, so dissimilar as to be wholly unrelated. Yet such is not the case in certain parts of far-off Australia. There, the sheep man needs protection against all animals, and wire by furnishing this protection, also protects the Empire, dependent on its wool and mutton.

One of the greatest problems facing the Australian sheep-man is the destruction of the wild dog—the natural enemy of his sheep.

Long before the coming of Dutch pirates and the first visit of Dampier, the dingo roamed at will and preyed on the kangaroo and the emu. There being no animals to prey on him, he was lord of all he surveyed. Occasionally the blacks stole puppies, reared and tamed them, and used them for hunting purposes, but, generally speaking, the dingoes were little molested.

Arcadian Days

In the Arcadian days of long ago, the rainfall was much greater than it is now, the lakes of Central Australia were always full. Water lay deep in the billybongs and creeks, and the dingo's victims ranged in thousands. But the climate changed, the lakes dried up or became salt marshes, drought was a constant visitor, and vast fires swept up and down the land. Like all other animals, the dingoes materially declined in numbers.

Nevertheless, for a certain reason, the dingo is nowadays more of a menace than ever. The breed is losing its purity with the introduction of the blood of the white man's dog, brought across the oceans. The result is the wild dog, a cross-bred beast that is stealthy yet ferocious, bold yet supremely cunning.

The Dingoes Bolt

During the pioneer days, before the advent of cheap German wire, railways, motor-cars, and corrugated iron, favoured individuals were granted vast tracts of land by the Colonial Authorities. If they were unfortunate enough to be obliged to pay the Crown any rent, it was at about one-twentieth of a penny per acre.

It was found that sheep throve and multiplied amazingly; it was also discovered, about the same time, that blacks and wild dogs alike were enemies of the sheep. Both blacks and dogs were cunning; but, whereas the blacks waited to be shot down, the dingoes bolted—and came again the next night.

The original squatters were no fonder of arduous personal exertion than are other human beings; and accordingly, since in their time the various colonies were yet in the making, they obtained labour from the convict settlements in the form of 'assigned servants." Most of these wageless "assigned servants"—fed on flour, tea, and sugar only, and promptly hanged if they killed a sheep for meat—were employed to shepherd the flocks by day and secure them within brush yards by night.

For the time being the dingo was beaten.

Changing Conditions

But the conditions changed. Presently, with the advance in civilization and humanity, the convict settlements were abolished and the supply of "assigned servants" ceased. Fortunately for both squatters and sheep, someone discovered gold, which lure attracted more immigrants than the less-exciting baits held out by the present-day immigration authorities.

The multiplying flocks of sheep were shepherded by free men for a wage of something like seven-and-six per week, plus the old flour, sugar, and tea in weekly rations of ten, two, and one-quarter pounds respectively.

And then, one fated day, a ship reached an Australian port loaded with cheap German wire.

That day is not printed in red on the Australian calendar; nevertheless, it witnessed the dawn of a new era. Areas of thousands of acres were fenced in and sheep-runs were divided one from the other with the rapidly-erected, sheep-proof fences. The sheep were allowed to roam at will within the confines of the paddocks; and, where a dozen of the old "assigned servants" were formerly employed in shepherding, a single well-mounted boundary-rider now mothers them from shearing to shearing.

The disappearance of the old-time shepherds, however, gave the dingo his chance, and retarded the country's pre-eminence in wool-production for years. In some districts the ravages of the dingoes wiped out the natural increase of the flocks; isolated squatters lost every sheep they possessed. The reason was simply that the five- and six-wire fences which kept the sheep inside the paddocks failed to keep the dog outside. He went in among the hapless animals, killing twenty from mere blood-lust where he needed but one for food.

Six Foot Wire Protects

It fell to the Governments of these States, which were the chief sufferers, to follow the pioneer example of private enterprise, the State of New South Wales proving the more energetic.

The Government of this State erected a six-foot wire-netted barbed-wire-topped fence along its northern and western boundaries, South Australia bearing half the cost of the fence adjoining that State, and Queensland doing the like.

Though the four-and-a-half-foot-netted fences erected by the companies were not entirely animal-proof, the six-foot fence is so without doubt. In fact, it is almost man-proof. It prevents inter-state migration of dogs and rabbits, which are governed by the weather conditions, and materially lessens the areas in which the dog can roam; and the smaller the areas become the greater the chance of his utter extermination.

Fence Is Expensive

By reason of its position the South Australia Border Fence, so named because it is administered by the Lands Department of that State, is far more expensive to maintain than that along the Queensland Border. Running, as it does, due north and south, it is exposed to the full fury of the westerly gales.

The State frontiers that it marks lie across some of the worst country in Australia, being covered by moving sandhills and sparse, stunted scrub, with very little water. Serried ranks of sandhills divided by narrow flats stretch as far west as Lake Frome and the Flinders Range beyond, the fence crossing on an average some six hills to the mile.

Saving From Obliteration

The creation of that fence laid the foundations of another science, which has for its object the conquest of wind-driven sand.

Boundary-riders have to labour constantly to save the fence from obliteration. Each man patrols a section of some twenty-odd miles, using the camel as the most suitable transport animal for sandy country. His work is to keep the fence at its regulation height of six feet, to keep it dog-proof, and to prevent its becoming the backbone of a sandhill.

The work of these boundary-riders is arduous and endless, executed under conditions from which the town-dweller would shrink appalled. Only once a month can they converse with their kind, excepting when the overseer passes on his rounds of inspection. Their diet, consisting of salt beef, baking-powder bread, jam, sugar, and tea, would stimulate most present-day explorers to stay at home.

Like tremendous waves of a wind-maddened ocean, the sandhills, under pressure of the gales, move northward as slowly and irresistibly as glaciers. The sand of which they are composed is exceedingly fine, and will ripple under the slightest breeze. A storm will move a sandhill a yard or more, and, scooping out the sand from beneath the fence on the windward side, and piling it over on the opposite slope, at times almost buries the netting.

The Upkeep

A fierce south-westerly gale plays a variety of tricks. It will "cut off" the summit of one hill so that the fence is in danger of falling; it will build up the corner of another hill so that it becomes necessary to "top" the fence, i. e., build a dummy fence above the original. It will form a sandhill where before there was a flat; and it will make some of the few gates impossible to open under less than a full day's laborious shovelling.

The ground at the base of the fence has to be kept clean of growing herbage and dead rubbish, for the wind must be given every assistance to drive the sand through the mesh of the netting.

Ceaselessly the men fight the sand. They work seven days in the week, for should there be a single hole the fence is not dog-proof, nor is it dog-proof if any portion of it is less than the regulation six feet above the ground. It may safely be assumed that twelve hours after a storm every foot of the fence has been inspected and made dog-proof.

Digest of articles published on Wire for past 25 years begins in JUNE ISSUE

The National Screen & Mfg. Co., Cincinnati, has purchased a four-story and basement addition on Beekman Street, giving 40,000 sq. ft. floor space and will add equipment. Frederick Bosken is president.

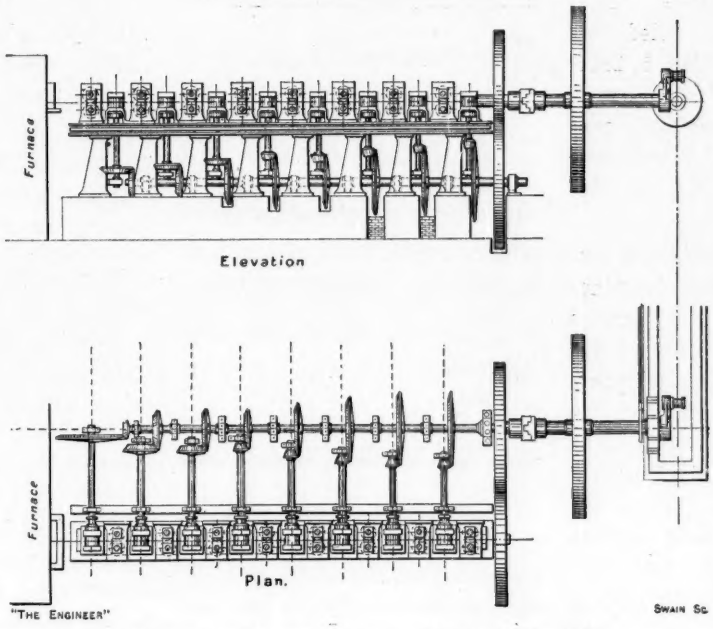
First Continuous System of Wire Rolling

By William C. Segal

IN a little factory on the outskirts of the city of Manchester, England, the first continuous system of wire-rod rolling was instituted.

The Braddock Ironworks, as this factory was known, was one of the pioneer establishments in the production of wire of all sorts.

It was J. P. Bedson, who after a preliminary trial, made in private, erected the first continuous mill in the year 1862. This mill remained in operation until 1884 and comprised a series of sixteen pairs of rolls, arranged alternately, vertically and horizontally. This alternate arrangement was adopted, so that the rod after having been deformed in one plane, was offered up to the next pair of rolls in the best position for further rolling. Capable of rolling down billets 18 ft. long and 1⅛ in. square, weighing 75 lbs. each, in No. 5 wire rods, the mill had an output of about 20 tons in a turn of 10 hours.



The first continuous wire rod mill, started in 1862.

A second continuous mill was put down in 1866. This mill, which still remains in commission, comprises alternate pairs of vertical and horizontal rolls, all driven by a spur and bevel gearing from a remarkable old steam engine. The mill rolls some 30 tons of rods per shift, but like its predecessor, suffers from the drawback that mill scale falls down on to the gearing for driving the vertical roll and naturally interferes with their running.

Benefiting by these experiences, Charles H. Morgan of Worcester, Mass., adopted all horizontal rolls in his mill. It became necessary, however, to the use of horizontal rolls to employ guides after each set of rolls which would turn the rod through 90 degrees. The maintenance of these guides is one of the chief cares of engineers in charge of modern continuous wire rod mills.

In 1916, a mill was put down at the Bradford Ironworks, which was constructed to the designs of Mr. J. P. Bedson. Although following the Morgan principle of having all the rolls horizontal, it is distinct in having all of them driven by toothed gearing. This mill has been in operation for some period and although it has never had an opportunity to show what it really can do, it has, at times, produced as much as 1,250 tons of rods a week.

Dinner to E. F. Weir

In observance of the 21st anniversary of the Weirton Steel Company, the office and executives of the Company tendered a dinner to E. F. Weir, President and head since 1908.

Mr. Weir's first job was with the Braddock Wire Company, Braddock, Pa. A year later he went to the Oliver Wire Co., Pittsburgh, where he remained for a period of ten years.

Six miles of 132,000 volt underground cable has been ordered by the State Line Generating Company of Indiana, who are starting construction of a 200,000 kilowatt power station on Lake Michigan at the Indiana-Illinois boundary.

Wire exports from Germany advanced noticeably during 1925, according to reports from the United States Dept. of Commerce.

New Spring Device

A device intended for use in making springs ranging in size from ⅛" to 1¼" inside diameter is being offered by the Fostoria Screw Company, Fostoria, Ohio. The size of the wire from which the springs may be made ranges from the smallest up to 3-16". The device is called the Rapid Spring Winder.

REVIEW OF RECENT PATENTS

WIRE DRAWING MACHINE. 1,568,793. Filed Nov. 18, 1924. Granted Jan. 5, 1926, to Clarence E. Atkins, E. Providence, R. I., assignor by mesne assignments to the Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

In this invention, Atkins provides a slow starting drawing-in action which accelerates later. Also a means for returning the wire engaging members to the starting point and reducing their return speed so as to provide the slow starting previously mentioned. This he accomplishes by means of clutches in accordance with their engagement. He also provides a slow driving clutch and a fast driven clutch and means for shifting from one to the other. And by means of a tripper plate affixed to the grippers and having connection to the clutches through rack and gearing, a method of gradually slipping or slowing the movement as mentioned.

WIRE MESH MACHINE. 1,572,491. Filed July 3, 1922. Granted Feb. 9, 1926, to Thomas H. Kane, Youngstown, O., assignor to the Truscon Steel Co., a Michigan corporation.

Kane's idea in this device is to produce woven wire mesh, more particularly such as is used for concrete reinforcement, in a more practical manner. He does this by providing rolls to feed the longitudinal bars, a hopper overhead to feed down staples, and a series of reciprocating dies or punches to clinch a number of the staples around cross wire and longitudinal bars all at one time.

The space on this page will be devoted to reviews of recent patents of interest to the wire industry.

Abstracts of these patents will be made and, if desired, WIRE & WIRE PRODUCTS will obtain for any subscriber the entire patent papers.

TRIMMING MECHANISM. 1,568,032. Filed Aug. 9, 1924. Granted Dec. 29, 1925, to R. I. Wilcox, Waterbury, Conn., assignor to the Waterbury-Farrel Foundry & Machine Co., Waterbury.

The first two Wilcox patents deal with a method of forming metal buttons from wire rod by means of different shaped punches and dies. 1,568,030 deals with the production by simple means of a button having an internal cavity of such a shape that the projecting end of an attaching tack when driven into it, clinches itself therein and forms a solid fastening means, eliminating thread or sewing. 1,568,031 deals with the methods of producing buttons of this type.

The third Wilcox patent deals with a complicated machine for forming bolts, blanks, screws and the like, and for trimming the heads of these after formation from blanks. It includes automatic delivery of the blanks to the working punch and die, so arranged that different sized and shaped blanks may be used.

WIRE DRAWING MACHINE. 1,482,348, reissue 16,236. Original filed Aug. 20, 1920, reissue filed Aug. 7, 1925. Granted Dec. 29, 1925 to Fred B. Crosby, Worcester, Mass., assignor to Morgan Construction Co., Worcester.

This relates to wire-drawing machines of the type in which a rotating drum or block is employed, on which the wire is wound as drawn through the reducing die. The object of this invention is to provide an improved form of wire-drawing block. This he does by providing the drawing blocks in pairs so arranged that they may be driven alternately, one acting first as supply and then as shaft device. The mechanism is so arranged as to permit changing the movement of the wire in this manner. The inventor claims that such alterations of direction of drawing preserves the dies longer, keeps them more accurate, tends to eliminate slivers in the wire, and also eliminates breakages of the wire.

METHOD OF FORMING BUTTONS AND THE LIKE. 1,568,303. Filed March 19, 1923. Granted Dec. 29, 1925, to R. L. Wilcox, Waterbury, Conn., assignor to the Waterbury-Farrel Foundry & Machine Co., Waterbury.

METHOD OF FORMING BUTTONS AND THE LIKE. 1,568,031. Filed March 19, 1923. Granted Dec. 29, 1925, to R. L. Wilcox, Waterbury, Conn., assignor to the Waterbury-Farrel Foundry & Machine Co., Waterbury.

TWO VALUABLE BOOKS

Wire Drawing and the Cold Working of Steel

By ALASTAIR T. ADAM, A.R.T.C.

(*Metallurgist, Messrs. Brunton's, Musselburgh, Great Britain*)

WITH NUMEROUS PHOTOMICROGRAPHS, DIAGRAMS AND TABLES

NO book dealing exclusively with this subject has been published within recent years; this book should therefore be found exceedingly helpful to the metallurgist and engineer by supplying, in a compact form, a fuller description than has been so far available of the manufacture, and the properties of, cold worked metal.

The author's intention is to explain the real nature of cold worked products, and to show how the physical properties required for a particular purpose may best be obtained. Four chapters are devoted to the processes of manufacture, two chapters to the physical properties, and another to the effect of low temperature annealing on these. A chapter on the underlying theories of plastic flow in metals is followed by one on the troubles and difficulties of cold working processes. The book concludes with a brief discussion on the application of cold work to alloy steels and non-ferrous metals.

$13.00 postpaid to any address

British Wire-Drawing and Wire-Working Machinery

By H. DUNELL, A.C.G.I., A.M.I.Mech.E., O.B.E.

(On the Editorial Staff of "The Engineer")

THIS book deals from the practical point of view with the rolling of wire rods and the drawing of steel and non-ferrous wires of all gauges. The making up of wire into various articles, such as netting, mesh, wires, safety-pins, needles, chains and many other commodities, is described and illustrated.

$7.50 postpaid to any address

BOTH BOOKS FOR $18.00

ADDRESS ALL ORDERS FOR ABOVE PUBLICATIONS TO

BOOK DEPARTMENT

WIRE AND WIRE PRODUCTS

461 Fourth Ave., New York, U. S. A.

REMITTANCE MUST ACCOMPANY ALL ORDERS

Trademarking Wire Products

(*Continued from page 14*)

transgressed corporate names (whether in the same field or not) when the nation's highest tribunal took a hand and upset all calculations. The U. S. Supreme Court was called upon to decide whether a corporation that placed "Simplex" in its official title could thereby call a halt on the use of "Simplex" by dozens of other firms engaged in as many different lines of trade. The case,—the first of the kind ever presented to the court of last resort—was recognized as a test. Therefore, when the Supreme Court said "No" it not only indicated that "Simplex" cannot be sewed up by any single house, but established the principle that the highest Federal authority will not sanction the idea of a universal monopoly in one of the popular, suggestive terms that are applied to many species of commodities. To be sure, the Supreme bench ruled that every case of this kind must be decided on its individual merits. But it indicated that there yet stands unrevised, the old doctrine that the inherent right of a trademark owner is only so broad as the line he manufactures or the stock he merchandises.

Encompassing Claims

The pronouncement from the Supreme bench will exert several distinct influences upon the branding of wire products,—a line that is particularly sensitive because, at various levels its wares are in competition with goods that are not at all of the same class, structurally speaking. The first fresh influence that will be brought to bear will be an urge upon the manufacturer of wire products to stake as large a trade-mark claim as he can. In this connection it is to be remembered by the producer that it is not necessary to manufacture or market an article on a large scale in order to preempt a trade-mark. A modest beginning, with evidence of intent to continue the business, is sufficient to implant a trade-mark. Accordingly, for the wire man, who plans to some day stretch his trade-mark to side lines it is a case of the quicker the better.

Proper Protection

A second consequence of the new turn of affairs is the fresh incentive that will be laid upon the wire brander to seek a mark that is the utmost in the unusual, —and that, if possible, is peculiarly suggestive of wire, its properties, or uses—rather than to be content with one of the standard, popular trade names that are duplicated in many different fields of commerce. The best recipe for a trouble-proof trade-mark is to coin a word that means nothing to the public when it is first introduced, and is therefore least likely to attract imitators, but which through use, backed by advertising, comes in time to distinguish the goods of the house that called it into being. Not that it is meant to intimate by this that a naked name is the ideal trademark. The conditions of affixing a trade-mark to wire goods make it desirable in many instances that the brand name or insignia shall be displayed on a diamond, a panel, a shield or some other background. This form of setting, especially when provided in contrasting color, is an advantage rather than otherwise. And, of course, the wire badger who desires to make use of a surname as a clue for customers needs to embellish the mere name with frills of some kind if it is to be protectable to the utmost.

Mention of methods of affixing trade-marks to goods, brings to mind the fact that one of the most interesting chapters in the entire history of trade-marking deals with the efforts of rope manufacturers, notably manufacturers of wire rope, cables, etc., to draft elements of their goods to perform the trade-mark function. To appreciate why this has been so ticklish a task, one must bear in mind that it is not allowable to make use of an article of manufacture, or even a picture of the goods, as a trade-mark. Carrying this idea farther, the courts and the umpires at the Patent Office have ruled, time and again, that a "structural feature" or component part of a manufactured article cannot in itself constitute a trade-mark for that article.

Facing this objection to making a trade-mark out of a self-container feature of the article to be identified, fabricators of wire products thought they saw a way to get around the difficulty by introducing color to emphasize the part that was to be made recognizable. So we have had the procession of "inventions" of colorful trademarks, such as red-hued wire bands on brooms, and green lines in the selvage of woven wire screens. But here, most of all, it has been necessary for the wire brander to watch his step, lest he run counter to that cardinal principle of trade-mark law which insists that there can be no trade-mark right in "mere color."

Famous Trademarking Cases will be discussed in June—WIRE AND WIRE PRODUCTS.

Addition of a Billet Mill

In order to change operations to conform with more modern mill practices, the American Steel & Wire Company will replace some of its old mill equipment at its Worcester, Mass., works.

A billet mill will be added to take steel from the present blooming mill and roll billets down to 1¾" square for the rod mill. At present the steel for the rod mills comes directly from the blooming mills in four inch sections.

Among the summer courses to be given in engineering at the Carnegie Institute of Technology is one on electric wiring. The course will begin June 14th and continue for six weeks.

Thirty-five Years of Wire

(*Continued from page 8*)

mills of that time. The prodigality practiced by most of these workers forms a chapter that causes us to pause and reach out for adjectives entirely beyond our ken. Seal skin sacks and diamond rings for their women folks were the order of the day. The wardrobes of at least a few of these men boasted silk hats and Prince Albert coats. Had the advent of the automobile occured twenty-five years earlier, I believe I know where super-straight eights would have found a ready sale.

New Use of Bronze Wire

An interesting example of the use of bronze wire is shown in the crossing of the Alleghany River by the transmission lines of the West Penn Power Co., says Pannell in High Tension Line Practice. The span is 1,450 ft. and the conductors have an area of .19 sq. in. being made up of 37 strands of silicon bronze wire, each of .075 in. diameter. The ultimate strength of the cable is 15,050 lb. corresponding to a stress of 80,000 lb. per sq. in. The maximum load in service is about half these figures.

The Glenn-Colusa Irrigation District, Willows, Calif., plans a hydroelectric power plant on the Sacramento River, near Hamilton City, Glenn Co., with initial capacity of 13,000 h. p. to cost with dam and transmission system $20,000,000. William Durbrow is manager.

The Texas Power & Light Co., Dallas, Tex., is negotiating for the purchase of the municipal electric light and power plant at Nacogdoches, Tex., and plans extensions and improvements, including additional equipment and transmission lines.

The Northwest Fence & Wire Works, Portland, Ore., has increased its capital from $50,000 to $100,000 and will make extensions, necessitating new equipment.

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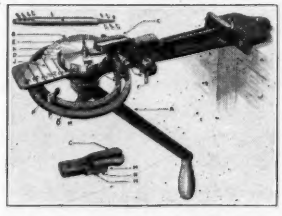

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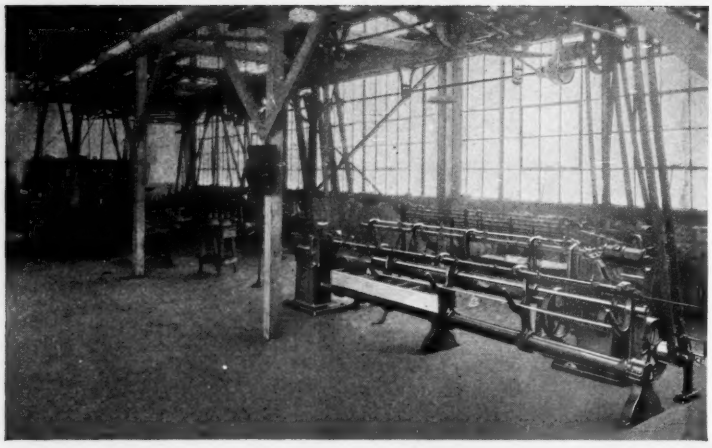

View of Straightening and Cutting Equipment.

Function of Wire Jobber

(*Continued from page 15*)

on the jobber. A large Michigan manufacturer, after scouring his city for a certain wire without success, phoned a Chicago jobber at 3:30 in the afternoon and wanted a few pounds of wire shipped by aeroplane from Chicago that afternoon. The aeroplane left the flying field at 6 p. m. Needless to say, this jobber had to do some tall hustling to get the order ready and delivered to the flying field, which incidentally is located miles away from his warehouse.

Straightening and Cutting Facilities

Still another service which buyers demand of the jobber is that he has straightening and cutting facilities. It would be obviously impractical for the jobber to carry in his stock the enumerable sizes and lengths he is called upon to furnish. The buyer is not at all interested in how the wire comes from the mill, his interest being confined to the size and length he is going to use. He assumes that the jobber will be in position to deliver just what he requests.

In order to meet the greatest percentage of demands made by the buyer, straightening and cutting facilities should include all sizes within a range of .035" to .375" depending, of course, largely upon the grade or quality of wire to be cut.

By the use of specially designed dies, one Chicago jobber is in position to straighten and cut on the standard rotary straightener square wires, flat wires and odd shaped wires providing such wires do not exceed .375 in any dimension, thus being in position to offer service not exceeded by the mill.

Special Service

Finally the buyer demands that his jobber's organization be imbued with willingness to serve, an honesty of purpose and a thorough knowledge of the products he sells. Large stocks, widely assorted sizes, central location, straightening and cutting facilities mean little to the buyer unless the jobber is willing to stretch a point in case such buyer is in need of some special service; therefore, those jobbers who have the facilities, who have the organization and who prove their willingness to serve have a very definite place in the scheme of marketing wire

A typical view of a warehouse stock of wire.

Tungsten Filament

(*Continued from page 13*)

heat carrier known, is promoted by playing the flames into or onto a pocketed bed of refractory material. As heat accelerates combustion, efficiency is promoted here and as incandescence promotes radiation, further efficiency is gained in this process. Hence these three factors, an unvarying and exact mixture, accelerated and thorough combustion, together with a high rate of radiation, combine to make a most efficient burner.

R. H. Shirk is now identified with the general sales office of the Union Drawn Steel Company, Beaver Falls, Pa. Mr. Shirk was formerly the assistant general manager of sales for the Lancaster Steel Products Corp., Lancaster, Pa.

Horace C. Hides, general manager of Thos. Firth & Sons, Inc., Hartford, Conn., died on March 19. Firth & Sons handle stainless steel wire and other stainless steel produced by Wm. Jessop & Sons, Sheffield, England.

Usual practice in stranding wire calls for the strands in arithmetical progression with a common multiple of 6, so that complete cables have 7, 19, 37 or 61 strands.

West Penn Power Co., Pittsburgh, will build a new automatic substation at Butler, Pa., and a new transmission line from the Springdale power plant, to cost $1,000,000.

Present Methods of Measuring Elongation

By L. D. Granger in

June Wire & Wire Products

Electrical Pointing

(*Continued from page 11*)

When making a point by means of a roll pointer, it is almost impossible to make a point that is true in shape, perfectly concentric with the wire that is to be drawn or free fro mslivers and fins. The result is a scratched die or one that is pulled out or round and wire that is rejected. It requires a very skilled operator to make a good point by this method.

To file a point is a still harder task. The point is rough and out of round. The cost of keeping the wire mill supplied with sharp files is a big item of continuous expense.

olling and filing points on round wire are the most common methods employed in wire mills today. When it comes to producing shaped wires, then neither of these methods can be used. The only successful way to point shaped wires is by the electrical method. Rolling or filing points on high carbon wires is always a difficult task. High carbon wires are pointed easier by the electric method than soft wires owing to the greater resistance of the higher carbon wires.

Weight of Wire Bars

In the United States, commercial wirebar weighs 225 lbs., is 50 in. long and 4 in. square with pyramidal ends. In Japan, the second largest producer, practically the same form is used, but in Europe, wirebars are customarily 4 0per cent lighter and smaller in proportion.

Form of Conductors

Composite conductors of aluminum and steel have been in use since 1910 and are standard on more than half the long distance transmission lines in this country and the other Americas, besides being used in France, Germany and Sweden. The simplest form provides a single steel wire around which are laid six strands of aluminum wire.

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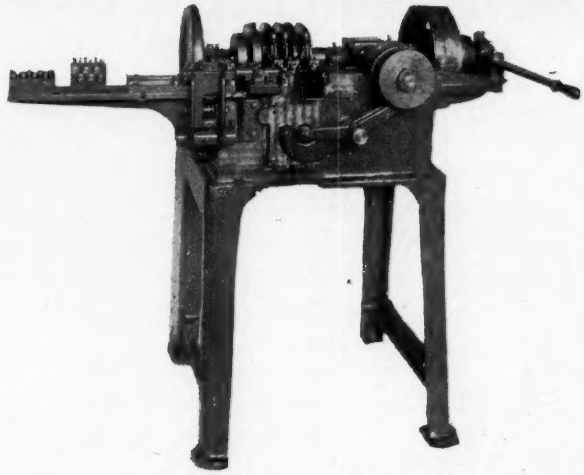

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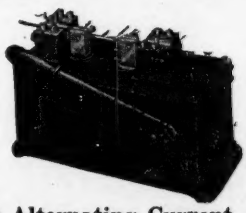

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Conference on Standardization of Sizes

AT a conference recently held at the Engineering Societies Building, New York, and attended by representatives of twenty-five organizations interested in all phases of the wire and sheet metal gauge system, a unanimous decision was reached that present gauging system had become intolerable and that industrial practice should be unified in a simple, consistent plan. The purpose of the conference was to arrive at a national standard system of designating the diameters of metal wire and the thickness of metal sheets.

Decision on the exact form of the system to be adopted was left to a sectional committee the scope of whose work was outlined as follows:

"The standardization of a method of designating the diameter of metal and metal alloy wire; the thickness of metal and metal alloys in sheet plate and strip form and wall thickness made of these materials; and the establishment of a standard series of nominal sizes and of tolerances for wire sheets plates and strips.

Those present at the conference were C. H. Guy, Youngstown Sheet & Tube Co., representing the American Association of Steel Manufacturers; Walter Voigtlander, American Cable Co.; H. F. Smith and M. O. Kapperl, American Can Co.; L. T. Robinson, General Electric Co., represening the American Institute of Electrical Engineers; W. E. Mackley, American Steel & Wire Co.; C. S. Gordon and J. H. Gray, American Telephone & Telegraph Co.; H. W. Bearce, Bureau of Standards; E. W. Ely, assistant director of metals utilization, Department of Commerce; H. W. Acton, Institute of Tack and Nail Manufacturers; B. M. Leece, Leece-Neville Co., Cleveland, representing the Society of Automotive Engineers; T. C. Tweedie, MacWhyte Co., Kenosha, Wis.; A. B. Forester, National Assn. of Purchasing Agents; G. H. Gage, Postal Telegraph & Cable Co.; A. J. Morgan, John A. Roebling & Sons, representing the American Mining Conference; R. F. Burnett, manager of the standards department of the Society of Automotive Engineers; Captain W. D. Styer, United States Army, Corps of Engineers; T. Gore and R. G. Richmond, Waterbury Co.; and L. Dwight Granger, Wickwire Spencer Steel Company.

Editorial: So Big

(*Continued from page 20*)

value of the product, $495,000,000 a year. Other plants using or dependent upon or concerned with wire exceed 575 and have an annual output valued above $531,000,000. The two, constituting the wire and wire products industries, make the very respectable total of 1,103 plants and $1,026,122,000 annual output.

And that, we submit, is somewhat of a lusty infant!

Laying aside the very large percentage of the non-ferrous metal establishments concerned with wire or wire products in some form, and the fact that this number should be added to the figures given for iron and steel previously, is it not time that the wire field had a mouthpiece of its own?

Men of the wire industries, this is your paper, it will become as big as you permit it to become, as useful as you insist on its being, as good as you want it to be and no better. What are you going to do about it, you men of this large and flourishing industry?

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